Volunteer Lake Assessment Program Individual Lake Reports

MASSASECUM, LAKE, BRADFORD, NH

MORPHOMETRIC DATA

Watershed Area (Ac.):	6,044	**Max. Depth (m):**	16.4	**Flushing Rate (yr^{-1})**	2
Surface Area (Ac.):	402	**Mean Depth (m):**	3.8	**P Retention Coef:**	0.59
Shore Length (m):	6,400	**Volume (m^3):**	6,229,000	**Elevation (ft):**	631

TROPHIC CLASSIFICATION

Year	Trophic class
1987	MESOTROPHIC
2005	MESOTROPHIC

KNOWN EXOTIC SPECIES

Variable Milfoil

The Waterbody Report Card tables are generated from the 2012 305(b) report on the status of N.H. waters, and are based on data collected from 2001-2011.

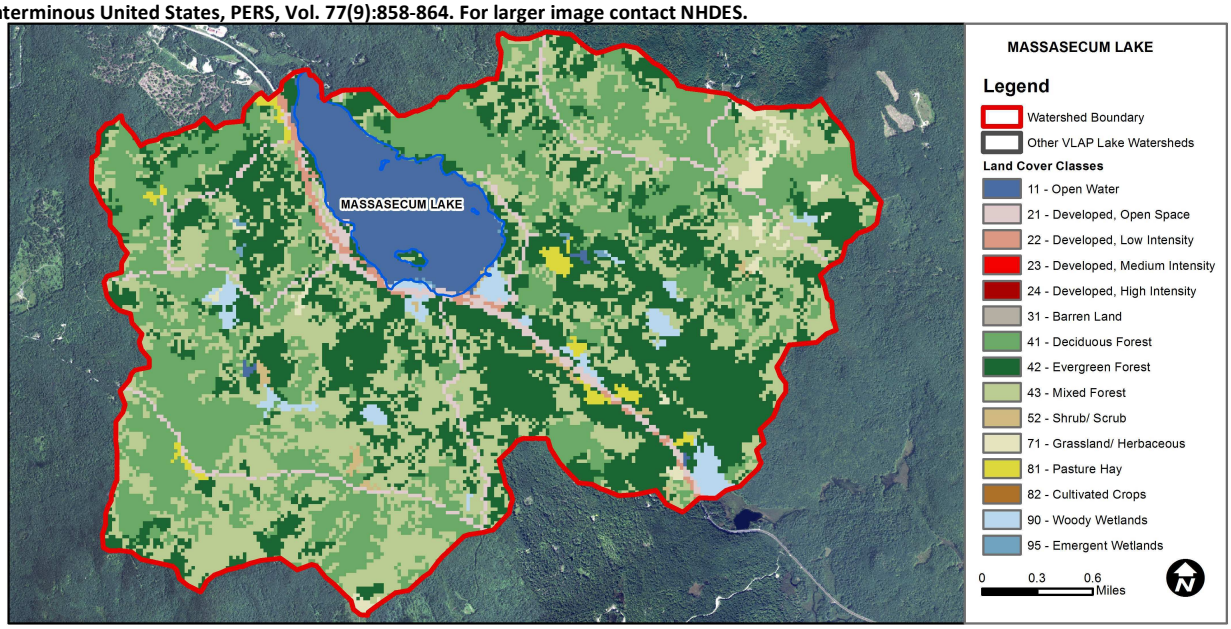
Designated Use	Parameter	Category	Comments
Aquatic Life	Phosphorus (Total)	Very Good	>5 samples and median is < 1/2 threshold.
	pH	Slightly Bad	>10% of samples exceed criteria by a small margin (minimum of 2 exceedances).
	D.O. (mg/L)	Encouraging	< 10 samples and no exceedance of criteria. More data needed.
	D.O. (% sat)	Slightly Bad	>10% of samples exceed criteria by a small margin (minimum of 2 exceedances).
	Chlorophyll-a	Good	>/=5 samples and median is < threshold but > 1/2 threshold value.
Primary Contact Recreation	E. coli	Very Good	All bacteria samples <75% of geometric mean criteria, but not enough to calculate geometric mean. Or, all bacteria samples are < single sample criteria and calculated Geometric means are less than geometric mean criteria.
	Chlorophyll-a	Very Good	At least 10 samples with 0 exceedances of criteria.

BEACH PRIMARY CONTACT ASSESSMENT STATUS

LAKE MASSASECUM - CAMP PIESAULE BEACH	E. coli	Very Good	All bacteria samples <75% of geometric mean criteria, but not enough to calculate geometric mean. Or, all bacteria samples are < single sample criteria and calculated Geometric means are less than geometric mean criteria.
LAKE MASSASECUM - FRENCH'S PARK TOWN BEACH	E. coli	Slightly Bad	Slightly exceeds criteria.
LAKE MASSASECUM - MASSASECUM CASINO BEACH	E. coli	Very Good	All bacteria samples <75% of geometric mean criteria, but not enough to calculate geometric mean. Or, all bacteria samples are < single sample criteria and calculated Geometric means are less than geometric mean criteria.

WATERSHED LAND USE SUMMARY

Fry, J., Xian, G., Jin, S., Dewitz, J., Homer, C., Yang, L., Barnes, C., Herold, N., and Wickham, J., 2011. Completion of the 2006 National Land Cover Database for the Conterminous United States, PERS, Vol. 77(9):858-864. For larger image contact NHDES.

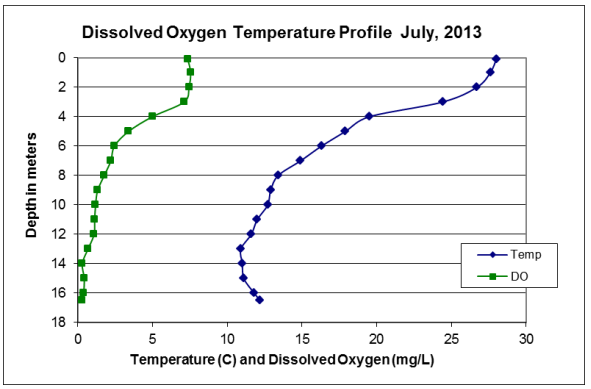


Land Cover Category	% Cover	Land Cover Category	% Cover	Land Cover Category	% Cover
Open Water	7.14	Barren Land	0	Grassland/Herbaceous	1.22
Developed-Open Space	3.22	Deciduous Forest	27.57	Pasture Hay	0.81
Developed-Low Intensity	0.67	Evergreen Forest	28.23	Cultivated Crops	0
Developed-Medium Intensity	0	Mixed Forest	28.68	Woody Wetlands	1.96
Developed-High Intensity	0	Shrub-Scrub	0.43	Emergent Wetlands	0.13

VOLUNTEER LAKE ASSESSMENT PROGRAM INDIVIDUAL LAKE REPORTS
LAKE MASSASECUM, BRADFORD, NH
2013 DATA SUMMARY

OBSERVATIONS AND RECOMMENDATIONS (*Refer to Table 1 and Historical Deep Spot Data Graphics)*

- **CHLOROPHYLL-A:** Average chlorophyll levels increased in 2013 and were greater than the state median. Chlorophyll levels have increased steadily since 2011; however historical trend analysis indicates stable chlorophyll levels with low variability between years.
- **CONDUCTIVITY/CHLORIDE:** Conductivity was low throughout the summer at the deep spot, Babcock Bk., Colby Bk., Howlett Bk., and Melvin Bk. Outlet. Frenches Park Bk. conductivity continues to be elevated. Historical trend analysis indicates relatively stable epilimnetic conductivity with moderate variability between years. Epilimnetic chloride levels were very low in June.
- **E. COLI:** Davis Bk., Davis Bk. #2 and Kerr E. coli levels were well below the state standard for surface waters throughout the summer.
- **TOTAL PHOSPHORUS:** Deep spot phosphorus levels were low throughout the season. All tributaries, except Davis Bk. experienced low phosphorus levels. Davis Bk. phosphorus was elevated in July following significant storm events which likely flushed the wetland system.
- **TRANSPARENCY:** Transparency in 2013 was lower than 2012 and likely the result of the increased algal growth and runoff from significant storm events. Historical trend analysis indicates stable transparency with low variability between years.
- **TURBIDITY:** Metalimnetic turbidity was elevated in August likely due to a layer of algae at that depth. Hypolimnetic turbidity was also elevated in August likely due to organic compounds released from bottom sediments. Davis Bk. turbidity was slightly elevated in July following a significant storm event and wetland flushing.
- **PH:** pH levels were lower than desirable range 6.5 – 8.0 units in the Metalimnion, Hypolimnion, and Davis Bk. Historical trend analysis indicates relatively stable epilimnetic pH with moderate variability between years.
- **DISSOLVED OXYGEN:** Dissolved oxygen levels were depleted through the Hypolimnion and into the Metalimnion in July. This indicates the potential for internal phosphorus loading, the process by which phosphorus is released from the bottom sediments during periods of oxygen depletion.
- **RECOMMENDED ACTIONS:** Conduct chloride monitoring at Frenches Park Bk. to establish baseline data as well as to identify the relative contribution to conductivity. Water quality is stable most parameters are low, however it was noted that significant storm events in June contributed to turbid conditions. Educate watershed residents on ways to reduce stormwater runoff from their properties utilizing DES' "Homeowner's Guide to Stormwater Management" tool.



NH Median Values: Median values for specific parameters generated from historic lake monitoring data.
Alkalinity: 4.9 mg/L
Chlorophyll-a: 4.58 mg/m^3
Conductivity: 40.0 uS/cm
Chloride: 4 mg/L
Total Phosphorus: 12 ug/L
Transparency: 3.2 m
pH: 6.6

NH Water Quality Standards: Numeric criteria for specific parameters. Results exceeding criteria are considered a water quality violation.
Chloride: < 230 mg/L (chronic)
E. coli: > 88 cts/100 mL – public beach
E. coli: > 406 cts/100 mL – surface waters
Turbidity: > 10 NTU above natural level
pH: 6.5-8.0 (unless naturally occurring)

Table 1. 2013 Average Water Quality Data for MASSASECUM LAKE

Station	Alk. mg/l	Chlor-a ug/l	Chloride mg/l	Cond. uS/cm	E. Coli #/100ml	Total P ug/l	Trans. m NVS	Trans. m VS	Turb. ntu	pH
Kerr					50					
Babcock Brook				40.0		9			0.29	6.45
Colby Brook				25.7		9			0.38	6.76
Davis Brook				61.7	43	16			1.01	5.74
Davis Brook #2					87					
Epilimnion	3.50	5.06	4	34.9		7	4.08	4.79	0.48	6.55
Metalimnion				39.4		6			1.49	6.01
Hypolimnion				41.4		9			2.25	6.01
Frenches Park Brook				107.7		5			0.47	6.56
Howlett Brook				29.6		8			0.41	6.71
Melvin Bk Outlet				36.4		7			0.54	6.63

HISTORICAL WATER QUALITY TREND ANALYSIS

Parameter	Trend	Explanation	Parameter	Trend	Explanation
pH	Stable	Trend not significant; data moderately variable.	Chlorophyll-a	Stable	Trend not significant; data show low variability.
Conductivity	Stable	Trend not significant; data moderately variable.	Transparency	Stable	Trend not significant; data show low variability.
			Phosphorus (epilimnion)	Stable	Trend not significant; data highly variable.